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(72) Inventor CECIL FRANKLIN

(54) IMPROVEMENTS IN AND RELATING TO THE WELDING OF PLASTICS MATERIALS



(71) We, CDM PLASTICS (KEW) LIMITED, a British Company of 9 Holborn Avenue, Industrial Estate, Mildenhall West Suffolk, IP28 7AN, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns the welding of plastics materials and in particular the high frequency welding of PVC and like materials.

It is known to form sachets from sheet plastics material by folding the sheet material and seam welding the edges together. In certain applications it is necessary to provide the sachet with a tube which communicates with the interior of the sealed sachet. Particularly this is the case in the medical field in the production of enema bags, urine bags, colostomy bags and blood-saline sample bags.

Where the communicating tube is also of plastics material such as PVC the tube has been welded to the plastics material forming the sachet at four points two of them adjacent the line of contact between the outer extremity of the sachet which makes contact with the tube and the other two of which have been between the walls of the sachet and the inner end of the tube within the sachet. Reliance for a watertight seal between the sachet and the pipe has been placed on the tightness of the ring of plastics material around the wall of the tube between the first mentioned two points of weld.

In practice this degree of sealing has been found to be inadequate and the reject rate of sachets produced in this fashion has been high.

It is an object of the present invention to provide an improved sachet of plastics material having bonded thereto a pipe of similar material for communicating in a watertight manner with the interior of the sachet.

It is another object of the present inven-

tion to provide an improved method of forming a watertight seal between the sachet walls and the outer surface of the communicating tube. 50

It is another object of the present invention to provide an improved method of high frequency welding applicable to welding plastics materials such as polyvinyl chloride sheet and polyvinyl chloride tube. 55

It is a further object of the present invention to provide an improved method of welding which is applicable to ultrasonic welding of polythene and like materials. 60

According to the present invention a closed sachet of sheet plastics material for holding liquids and particularly for medical use includes a tube also of plastics material which extends through the sachet wall to communicate with the interior thereof, a watertight seal being provided between the external surface of the tube and the sachet walls by means of a plurality of parallel spaced apart welds running substantially transversely to the axis of the tube and thereby stretching the sheet material forming the sachet walls tightly over the plastics tube for the greater part of the length of the tube which lies within the sachet. 70

Preferably the plurality of parallel spaced apart welds together form a welded band. 75

Preferably the stretching is sufficient to cause a reduction in the diameter of the tube over the length of the welded band. 80

Preferably a short length of tube is left free within the sachet beyond the welded band, which being unconstrained, possesses the normal, larger diameter as compared with that section within the welded band, the bulge of material in the said short length further assisting in the creation and maintenance of the said watertight seal. 85

The sachet may be an enema bag or urine bag or the like for use in medical work. 90

The invention also provides a method for forming high frequency welded watertight joints between a plastics sheet material and a tube of similar material, to form a closed

sachet, in which a layer of compatible insulating material is provided on each of the electrode surfaces used to effect the weld, to prevent arcing therebetween.

- 5 By compatible is meant a material which will not adhere to the sheet plastics material when the latter is in a plastic state.

Where the sheet material and tube are of PVC the insulating material is preferably
10 PTFE.

A typical thickness for the insulating layer is seven thousandths of an inch.

- Also according to the invention, a method of forming a closed sachet comprises centrally perforating a substantially rectangular sheet of plastics material to form a circular hole equal to the diameter of a tube to which it is to be joined, inserting the tube and folding the sheet along a line perpendicular to the tube, which line is also the diameter of the tube at the point of entry of the tube into the sachet, seam welding the edges of the sheet of plastics material and additionally forming a series of closely spaced parallel welds perpendicularly to the length of the tube where the latter enters the folded sheet, using a high frequency welding machine having a pair of electrodes between which the folded sheet and the tube are compressed, the opposed surfaces of which are coated by a thin layer of compatible insulating material.

The invention will now be described by way of example with reference to the accompanying drawings in which
35 Figs. 1 to 3 illustrate the formation of a sachet for medical use wherein Fig. 1 illustrates the sheet of plastics material from which the sachet is formed, Fig. 2 the first step of folding the plastics sheet and Fig. 3 the final step after seam welding the open edges of the sachet, and

Fig. 4 is a perspective view of a pair of electrodes adapted to weld the two plastics materials together in accordance with the invention.

As shown in Fig. 1 a sachet may be formed from a rectangular sheet of polyvinyl chloride (PVC) 10. The sachet is to be secured to a tube of PVC and to this end a hole 12 of diameter equal to that of the tube which is to be inserted into the sachet, is formed in the centre of the sheet 10.

As shown in Figs. 2 and 3, a sachet is formed by inserting a tube 14 into the hole 12 and folding the sheet 10 about a line through the centre of the hole 12 and perpendicular to the length direction of the sheet 10. The sheet 10 is then folded in half as shown in Fig. 2 and the latter is situated between the two electrode jaws of a high frequency welding machine (not shown). After welding, a welded band 16 exists over a large percentage of the length of the tube which lies within the sachet. In this way a

good watertight seal is formed between the walls of the sachet and the tube.

The remainder of the sachet is formed in known manner by seam welding the edges of the sheet 10.

In accordance with the invention, the two electrode jaws 18 are each covered with a thin sheet 20 shown cut away on the lower jaw of compatible insulating material to prevent arcing between the two electrodes and the resulting breakdown of the weld. A typical insulating material for use with PVC sheet is PTFE. The two electrode jaws are each cut away centrally to accommodate the increase in thickness of that region of the sachet which receives the length of tube.

WHAT WE CLAIM IS:—

1. A closed sachet of sheet plastics material for holding liquids and particularly for medical use which includes a tube also of plastics material which extends through the sachet wall to communicate with the interior thereof, a watertight seal being provided between the external surface of the tube and the sachet walls by means of a plurality of parallel spaced apart welds running substantially transversely to the axis of the tube and thereby stretching the sheet material forming the sachet walls tightly over the plastics tube for the greater part of the length of the tube which lies within the sachet.

2. A closed sachet as claimed in Claim 1 in which the plurality of parallel spaced apart welds together form a welded band.

3. A closed sachet as claimed in Claim 1 or Claim 2 in which the stretching is sufficient to cause a reduction in the diameter of the tube for at least some of the length of the welded band.

4. A closed sachet as claimed in Claim 2 or Claim 3 in which a short length of tube is left free within the sachet beyond the welded band, which being unconstrained, possesses the normal larger diameter as compared with that section within the welded band, the bulge of material in the said short length further assisting in the creation and maintenance of the said watertight seal.

5. A closed sachet as claimed in any of the preceding claims in the form of an enema bag or urine bag or blood-saline solution bag or colostomy bag.

6. In a method forming high frequency welded watertight joints between a plastics sheet material and a tube of similar material to form a closed sachet as claimed in claim 1, a layer of compatible insulating material as hereinbefore defined is provided on each of the electrode surfaces used to effect the weld, to prevent arcing therebetween.

7. A method as claimed in claim 6 in which the sheet material and the tube are of PVC.

8. A method as claimed in claim 6 or 7 in which the compatible insulating material is PTFE.
- 5 9. A method of forming a closed sachet as claimed in claim 1 comprising centrally perforating a substantially rectangular sheet of plastics material to form a circular hole equal to the diameter of a tube to which it is to be joined, inserting the tube and folding the sheet along a line perpendicular to the tube, which line is also the diameter of the tube at the point of entry of the tube into the sachet, seam welding the edges of the sheet of plastics material and additionally forming a series of closely spaced parallel welds perpendicularly to the length of the tube where the latter enters the folded sheet using a high frequency welding machine having a pair of electrodes between which the folded sheet and the tube are compressed, the opposed surfaces of which electrodes are coated by a thin layer of compatible insulating material as hereinbefore defined. 20
- 10 10. A closed sachet of plastics material constructed and arranged substantially as herein described with reference to and as illustrated in Figs. 1 to 3 of the accompanying drawings. 25
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KEITH W. NASH,
Chartered Patent Agent,
2 Wingate Way, Cambridge, CB2 2HD.
Agent for the Applicants.

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COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of
the Original on a reduced scale*

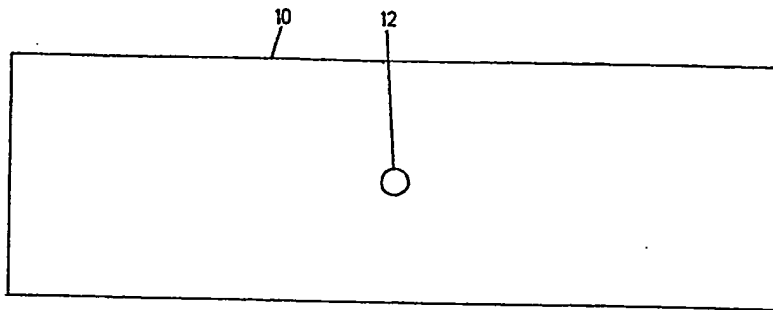


FIG. 1

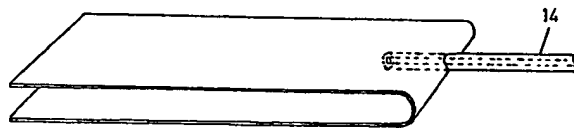


FIG. 2

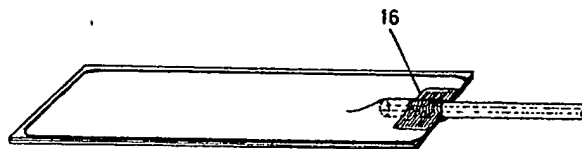


FIG. 3

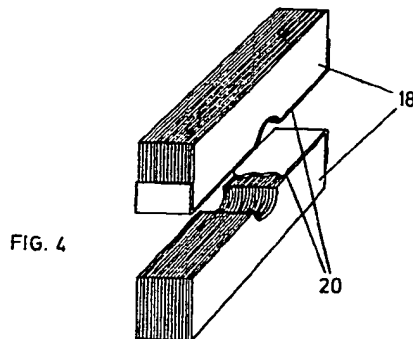


FIG. 4